DOCUMENT RESUME

ED 112 812 HE 006 885

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TITLE A Data-Based Approach to Setting Performance Standards.
INSTITUTION Connecticut Univ. Health Center, Farmington. Dept. of Research in Health Education.
SPONS AGENCY National Fund for Medical Education, Cleveland, Ohio.
PUB DATE Apr 75
NOTE 18p.

EDRS PRICE MF-$0.76 HC-$1.58 Plus Postage
DESCRIPTORS *Behavioral Objectives; Core Curriculum; Curriculum Development; Curriculum Planning; Educational Objectives; Faculty; *Higher Education; *Medical Education; Medical Students; *Performance Criteria; *Teacher Participation

ABSTRACT

Preparatory to developing a core curriculum with the possibility of instituting a tracking system, the Committee on Undergraduate Medical Education at the University of Connecticut Health Center appointed a committee that set out to find a systematic way of looking at the curriculum. The committee developed a personal-political approach and research methodology in which an educator involved faculty members in writing and reviewing educational goals and objectives (affective, cognitive, and psychomotor). The performance standards developed by the 24 teaching committees were rated by the teaching faculty (for clarity and importance) and will subsequently be reviewed for relevance by other faculty groups. They will be published and will serve as the basis for the evaluation of student performance. Meanwhile, the day-to-day benefit of this systematic definition of curriculum may be far more important to the institution than the original purpose. (JT)

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ED112812

A DATA-BASED APPROACH

TO SETTING PERFORMANCE STANDARDS

(This project was supported by a grant from the
National Fund for Medical Education)

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HE 006 885

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April 1975

INTRODUCTION: A THREE-YEAR PROGRAM?

A few years ago there was an idea that medical schools could produce students with a "core" knowledge of medicine in three years rather than in four years. This plan, the argument went, would enable students to proceed earlier into a specialty track and thus enter practice sooner. The federal government was encouraging such three-year programs and offering special funds to schools which participated. Some medical schools responded to the financial inducements to design three-year programs; other schools more cautiously debated whether such experiments might lead to poorly prepared doctors and wondered whether their programs could be tightened up to produce equally competent doctors in a shorter time.

The Committee on Undergraduate Medical Education at the University of Connecticut Health Center decided that the best approach was to appoint a committee called the Core and Tracking Committee to explore with faculty from our 24 teaching committees the core competencies required in each of them and to make recommendations concerning mechanisms for increasing elective and tracking opportunities.

The Core and Tracking Committee set out to determine if there was a systematic way of looking at our curriculum. Our long-range goal was to collect data, using a judgmental approach, which would provide a rational basis for developing a core medical curriculum with the possibility of instituting a tracking system. As you might suspect, this study lead us into institutional politics and forced us to become change agents.

I would like to describe the medical school environment, our school's needs for a more explicit curriculum, and finally the methodology we used to develop performance standards.

PLANNING

The early stages of the work on the project involved getting to know the medical environment and planning the best ways to proceed in getting the work done. A major concern was that we insert ourselves carefully into the environment, since we had to win the cooperation of the faculty and could not force anyone to cooperate with us. Thus our first step was to conduct a round of interviews with some of the teaching committee chairmen, academic departmental chairmen, and members of our Core and Tracking Committee. We felt that it was important for them to hear our ideas about an explicit curriculum and for us to see the educational system of the Health Center through their eyes.

During these interviews we gained an understanding of the teaching organization and heard faculty opinions about what was right and wrong about our program and got their opinions about a "core" curriculum. There was much contentment with the status quo, and many committees felt that their courses already consisted of a minimal core. We found that in our educational program (as in many medical education programs which are organized around organ systems, rather than the traditional academic departments) the teaching program floats with little organizational structure. Teaching committee chairmen are selected from the general faculty with no concern for departmental base; similarly persons from various departments are asked to teach on these committees. This results in the chairman not always knowing the whole content area of which he is the chairman. It also means that the faculty who teach on the committee may not know each other and may not even see each other to plan the course -- they may just fill in lecture slots in the syllabus.

Heading a subject committee was a burden not always relished by a subject committee chairman. A faculty person was rewarded institutionally

and nationally for his research; educational matters demanded his time (in planning the course, developing schedules, writing tests, finding lectures and preceptors for labs, determining curriculum, ordering movies and library materials, attending meetings, tutoring students with problems, etc.) and provided few rewards. Being a chairman demanded perhaps a month of planning time, plus the hours which the chairman was expected to spend in lecturing and in attending other lectures.

With many educational responsibilities, the chairman was often forced to leave the course content pretty much the way it had been in previous years; curriculum revision normally received little attention in committee meetings. The curriculum was imperfectly defined by a book called the syllabus. This book listed the topics for each of the class sessions and often contained outlines of the subject matter, supplemental readings, and self-study materials. Often the chairman was not an expert in all the subject matter taught in his organ-centered committee, so he frequently relied on the individuals who taught on the committee to determine their own curriculum content. At worst, curriculum segments were determined by that one individual with no systematic provision for review by other faculty. At best, the chairman and two or three others planned the appropriate global content for the course and tried to focus lecturers to those topics. In clinical areas, students learned from preceptors whose concept of appropriate curriculum content was usually even less explicit and more varied.

The subject chairman had no power either to reward or to punish; he had to operate on the basis of professional responsibility, personal respect, and friendship. In a parallel situation, the project director had no power over the people with whom he worked; he had to make his case the best he could and try to convince the chairmen (and through them

their teaching colleagues) that this effort of determining performance standards was worthwhile.

NEED FOR AN EXPLICIT CURRICULUM

As we conducted our interviews we built up a rationale for writing objectives. It appeared that in addition to serving the long-range needs of the Core and Tracking Committee, determine course objectives could be helpful to many constituencies at the Health Center.

Students

Focus on material: Students are often confronted with huge syllabi full of information which they are supposed to "know." Objectives can help them to focus on the important topics of study and help them to see some overall organization of the material.

Teaching Faculty

Curriculum definition: Specifying objectives is a way of defining a curriculum in an explicit way, rather than in the implicit way preferred by many faculty. The explicit curriculum -- as defined by a list of objectives -- can be the basis for rational deliberation in which the discussion can be focused on specific points. In the past curriculum guidelines often consisted of lists of the course content with no indication of what the student should be able to do with that content.

Student evaluation: Similarly the faculty can ask "What is the best way to evaluate whether the student is attaining this objective?" The list of objectives can serve as a basis for evaluating the student's skills and knowledge, and for making recommendations to the student for additional work. Attitudinal objectives can provide a basis for narrative

evaluative comments which we use to supplement on pass/fail grades.

Course integrity: Perhaps the best reason for having objectives is so faculty can specify what is important for the students to know and perform, validate that decision by a democratic polling, and then cooperate in trying to attain those objectives. Unless faculty are in agreement in what they are trying to do, and unless those things which they are trying to do are spelled out and communicable, it is more likely that faculty will take a shotgun approach to the presentation of material and will not successfully integrate it into a meaningful course. Only after objectives of a program are delineated is it possible to determine priorities among those objectives through systematic ratings by the teachers and by other professionals.

Having identified the needs for curriculum definition we had to determine a format for stating the objectives, decide on the language to be used in stating the objectives, and plan the later steps in the process.

METHODOLOGY

Format for the Objectives

After some review of the materials on writing objectives by Mager, Gronlund, and others we developed a format for objectives:

1. All objectives would state the acts which STUDENTS would be required to accomplish. The implicit stem of each objective would be "the student will be able to . . . "

2. Objectives would be time referenced to the end of the course. Thus there was an implicit "at the end of this course . . . " associated with each statement.

3. The body of the objective would be composed of two essential parts - a behavioral verb and a bit of content. The verb defined the way in which a student might be appropriately required to demonstrate his achievement of the content which was specified in the objective.

4. The behavioral verbs could not be "know," "understand," of any one of several listed verbs which have multiple interpretations. The verb had to be more of a behavioral sort, such as those found on a list of suggested verbs which we provided to writers. (Handout)

Objectives were defined as descriptive statements which lay somewhere in specificity between the goal statement of "knowing biochemistry" and the specific statement of a fact to be recalled. Faculty were encouraged to consider three types of objectives: affective, cognitive, and psychomotor. Affective objectives were especially encouraged.

Scales for Ranking Objectives

After some deliberation of the dimensions on which objectives could be rated, we decided that objectives should be rated on their CLARITY (i.e., ability to clearly communicate to the reader the behavior which the student was expected to display in achieving the objective) and on their CENTRALITY (i.e., the essentiality for every student in the program to achieve the objective). (Handout)

Clarity: Each judgment of clarity included a recommendation to the Committee on what to do to improve the objective. The choices were:

JUDGMENT	RECOMMENDATION
Very Clear	Leave it alone
Quite Clear	Could tighten it up
Varied Interpretations Possible	Needs Work
Somewhat Unclear	Revise
Very Unclear	Rewrite

Centrality: The other scale on which ratings were made was the scale on which reviewers could rate the Centrality or essentiality of each objective. The question was "how essential is it for every student in our program to achieve this objective?" The choices were:

Essential for all students
Desirable but not essential
Useful but should not be required
Unessential
I am unable to judge

This first rating was done only by members of the committee whose objectives were being written and was done as a way of helping them to identify the objectives with which they did not agree on the appropriate content depth or student behavior. As faculty looked at the objectives they were invited to modify objectives, delete objectives, and add objectives.

Since the writing of the objectives was frequently done by small groups, this rating process allowed all committee members to participate and informed them of the curriculum deliberations going on within their committees. (Handout)

Working with Faculty

We decided to be flexible and allow serious deviations from the initial plan. As it turned out, it was easier to accomplish the task of getting objectives written by ignoring much of the initial plan: the chairman of the committee and two other persons seemed about the right number to work with; explaining objective writing and the cognitive, affective, and psychomotor domains took only 10-20 minutes. Most groups did not need to devote any time exclusively to determining course content; course content appeared to be well fixed in their minds. Deciding the appropriate expectations for students was more difficult, yet the actual task of writing the objectives did not seem as difficult as most people had expected. Four to ten hours were required for an overage six-week committee, and three hours at one stretch seemed to be the maximum tolerable time for this kind of mind searching.

We tried to avoid making the working sessions a time for debating the pros and cons about writing objectives; we merely challenged them to tell us what it was that they expected a student to be able to do by the

end of their course-- or conversely, what they would be unhappy about if students could not do it by the end of the course. The project director acted as secretary/catalyst/provocateur and wrote down their statements as they thought them out.

In some cases the faculty referred to a copy of their syllabus or a class schedule to refresh their memories. Often the emergence of an objective would be prefaced by deep thought or discussion about just what the student was really supposed to learn. Frequently the person would struggle for a minute in his mind with an objective, then choose a verb from the verb list to describe the way in which students could be asked to demonstrate their knowledge. Most faculty soon recognized the groupings of cognitive verbs into hierarchial categories.

Any objective considered important by the faculty person was accepted, although the clarity of the statement would be questioned if it were unclear or confusing to the director.

STATUS

In two years of part-time effort almost all of our 24 committees have prepared objectives. Five or six committees have published these objectives in their syllabi. Some committees are using their objectives to develop performance standards for student evaluation. This phase of the work will continue during the next two years.

In summary, the day-to-day benefits from this systematic definition of curriculum may be far more important to the institution than their original purpose of considering a core program with possible early tracking. The interaction of staff in rethinking courses and writing objectives has resulted in statements of the educational objectives of committees, but in a more important sense it has caused a seven-year-old institution to

rethink its educational goals, its committment to education, and perhaps to reorganize its educational system and its reward system.

HANDOUT

A DATA-BASED APPROACH FOR SETTING PERFORMANCE STANDARDS

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April 1975

SOME POSSIBLE VERBS FOR USE IN STATING COGNITIVE OUTCOMES

Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
define	discuss	compute	distinguish	diagnose	evaluate
list	describe	demonstrate	analyze	propose	compare
recall	explain	illustrate	differentiate	design	assess
name	identify	operate	compare	manage	justify
recognize	translate	perform	contrast	hypothesize	judge
state	restate	interpret	categorize	summarize	appraise
repeat	recognize	apply	appraise	compose	rate
record	express	employ	calculate	plan	revise
label	locate	use	test	formulate	score
	report	practice	criticize	arrange	select
	tell	schedule	diagram	assemble	choose
	transform	sketch	inspect	collect	estimate
	convert	prepare	question	construct	measure
	distinguish	modify	relate	create	argue
	estimate	predict	solve	organize	decide
		extrapolate	examine	prepare	criticize
			classify	modify	
			deduce	invent	
			outline	generate	

Some Verbs for Use in Stating AFFECTIVE Outcomes:

show sensitivity
accept responsibility
be willing to assist
respond to emergency situations
practice sterile technique
follow directions
accept differences
complete assignments
participate in discussions
enjoy an activity
demonstrate commitment
respect opinions
state an opinion
be present at night deliveries
observe three deliveries

Some Verbs for Use in Stating MOTOR Outcomes:

calibrate a polygraph
perform a pelvic examination
tie a square knot
locate a nerve
dissect a rat
weigh an infant
set up equipment

Craig Gjerde
U. Conn. Health Center

AVOID THESE WORDS: They have ambiguous interpretations -

knows
comprehends
thinks critically
understands
appreciates
has an interest in
fully appreciates
grasps the significance of

learns
respects
expands his horizons
works effectively
speaks effectively
speaks correctly
reads with ease
uses basic skills

THE UNIVERSITY OF CONNECTICUT
HEALTH CENTER

14 August, 1974

Dear Biostatistics Participant,

The Biostatistics subject committee is cooperating with the Core and Tracking Subcommittee of CUME in specifying and obtaining ratings on its educational objectives. We never did get around to rating a final list of objectives. Would you please identify any missing objectives, modify objectives which might be poorly focused, and finally rate each of the objectives in terms of its clarity and in terms of its centrality or importance.

These are the scales on which you are asked to rate the objectives:

Clarity of Statement

How clearly does this objective communicate the behavior which the student is expected to display in achieving the objective?

Very Clear Leave it Alone	Quite Clear Could Tighten it up	Varied Interpretations Possible Needs Work	Somewhat Unclear Revise it	Very Unclear Rewrite it

Centrality in UCHC Curriculum[1]

How essential is it for every student in our program to achieve this objective?

ESSENTIAL for all students	DESIRABLE but not essential	USEFUL but should not be required	UNESSENTIAL	I am unable to judge

After the suggestions and ratings are considered, the objectives will be shared with other subject committees. Please return your ratings in the envelope provided by mid-September.

Craig Gjerde

1/ Adapted from Bruce Spivey, "A Technique to Determine Curriculum Content," Journal of Medical Education, 46:269-74, 1971.

FARMINGTON, CONNECTICUT 06032

RATINGS OF OBJECTIVES

Instructions: After you read each objective, rate its clarity and its centrality. Feel free to revise any objective and to suggest additional objectives.

Name (optional) _____

Date: _____

Biostatistics

Educational Objectives

6/26/74

		Clarity of Statement: How clearly does this objective communicate the behavior which the student is expected to display in achieving the objective?					Centrality in VCNC Curriculum: How essential is it for every student in our program to achieve this objective?				
		Very Clear Leave it Alone	Quite Clear Could Tighten it up	Varied Interpretations Possible Needs Work	Somewhat Unclear Revise it	Very Unclear Rewrite it	ESSENTIAL for all students	DESIRABLE but not essential	USEFUL but should not be required	UNESSENTIAL	I am unable to judge
UNIT 1											
1	Define the three measures of central tendency. 1. Mean 2. Median 3. Mode	9	8	7	6	5	4	3	2	1	0
2	Define the two measures of dispersion. 1. Variance 2. Standard Deviation.	9	8	7	6	5	4	3	2	1	0
3	Given a set of numbers calculate both by hand and by using a calculator each of the following: 1. Mean 2. Variance 3. Standard Deviation.	9	8	7	6	5	4	3	2	1	0
4	State the essential parameters needed to define a normal curve.	9	8	7	6	5	4	3	2	1	0
5	Given the appropriate information, transform a raw score into its standard (Z) score and vice versa.	9	8	7	6	5	4	3	2	1	0
6	Translate values of Z to areas of the normal curve and vice versa.	9	8	7	6	5	4	3	2	1	0
7	Describe and contrast the three scales of measurement: 1. Nominal (Discrete) 2. Ordinal (Ranked) 3. Interval (Continuous)	9	8	7	6	5	4	3	2	1	0
8	Distinguish between clinical and epidemiological studies.	9	8	7	6	5	4	3	2	1	0
9	Classify epidemiology research into prospective or retrospective designs.	9	8	7	6	5	4	3	2	1	0
10	Given the following points from the Schor article: 1, 3, 6, 8, 9, 10, 11, and 12, explain them in your own words. Or given a short example, identify the major faults according to Schor.	9	8	7	6	5	4	3	2	1	0
UNIT 2											
1	Determine whether two events are dependent or independent.	9	8	7	6	5	4	3	2	1	0
2	Apply the addition and product roles for calculating probabilities.	9	8	7	6	5	4	3	2	1	0
3	Determine whether a given variable is distributed according to the binomial distribution.	9	8	7	6	5	4	3	2	1	0
4	Calculate probabilities using the binomial formula. Example: What is the probability that a random selection of 10 people will yield 6 with blue eyes if the probability of blue eyes is 0.4 in the general population.	9	8	7	6	5	4	3	2	1	0
5	Calculate the mean and variance of a binomial distribution.	9	8	7	6	5	4	3	2	1	0
6	Use the normal distribution to approximate binomial probabilities.	9	8	7	6	5	4	3	2	1	0

DO NOT WRITE ON TESTS
USE PAPER PROVIDED

(20) 1. Which of the following attributes are distributed according to the binomial distribution. Explain your answer.

A. sex
B. race
C. age
D. hair color
E. hand used to brush your teeth
F. weight

(20) 2. If the five year survival rate for a particular disease is .60, what is the probability that exactly 2 of 3 patients with the disease will be alive at the end of five years.

(20) 3. In the general population, 12% of all people are left handed. In a random sample of 100 people, what is the probability of obtaining 80 or less right-handed people?

(20) 4. Using the binomial formula $\frac{n!}{r!(n-r)!} \cdot p^r q^{n-r}$ what is the probability that at least 2 of the 4 patients a physician is treating will survive if the fatality rate for the disease is 0.25?

(20) 5. Of 10 patients with a particular disease, what is the expected mean number of survivors if the survival rate is 0.35? Also calculate the variance and standard deviation for this distribution.

NOTE: On problems involving calculations, it is only necessary to set up the arithmetic.

DO NOT WRITE ON TESTS
USE PAPER PROVIDED

University of Connecticut Health Center
Committee on the Curriculum

Subject Committee Chairman: D. Almond
Curriculum Chairman: Craig L. Gjerde

MEDICAL SELECTIVE

EDUCATIONAL GOALS AND OBJECTIVES

GOALS

1. Understand the principles, practice, and scope of the specialty of Internal Medicine.

2. Understand the correct approach to and the medical management of a sick adult.

OBJECTIVES

1. Independently define the critical questions about the patient's episode of illness; suggest means by which the questions could be answered; try to obtain the information to answer the critical questions.

2. Elicit histories that are complete to the point where a more experienced physician cannot consistently obtain relevant additional data from the patient at roughly the same point of time.

3. Obtain additional information about a patient from other sources when it is necessary to do so.

4. Perform physical examinations that are generally complete and accurate within a reasonable period of time.

5. Perform certain laboratory tests (e.g., examination of a peripheral blood smear, determination of the hematocrit, and a complete urinalysis) routinely on all patients worked up by students, and other tests (e.g., gram stain of body fluids) on selected patients when indicated.

6. Prepare a complete, accurate, and appropriate problem list expressed in words that reflect the degree of definition of the problem.

7. Interpret or assess each item in the problem list, and provide an appropriate differential diagnosis and formulation wherever they are indicated.

8. Develop a plan of management that contains appropriate diagnostic, therapeutic, and patient education elements; carry out this plan responsibly when it has been approved; explain the mechanism of action of the drugs used.

9. Justify your diagnostic and therapeutic plan by assessing the benefits and risks of each element of the plan.

10. Communicate tactfully with the patient using language that he is most likely to understand, and demonstrate a degree of sensitivity toward the concerns of the patient and his family.

January 14, 1975

11. Tactfully explain to the patient and/or his family the nature of the illness, its evaluation, treatment, prognosis, and any alterations in life style which it necessitates.

12. Follow the patient closely throughout his hospitalization in order to understand, insofar as it is possible, what is going on with that patient at any point in time; revise formulations whenever new evidence warrents doing this.

13. Write appropriate problem-oriented progress notes in the chart.

14. Interpret all available diagnostic information about a patient, e.g., x-rays, biopsy material, lab tests, procedure results such as sigmoidoscopy findings.

15. Write appropriate orders using the correct format.

16. Perform certain procedures, e.g., venipuncture, arterial puncture, thoracocentesis, lumbar puncture, EKG.

17. Write a discharge summary.

18. Interact appropriately with peers and other members of the health care team.